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ACC-RAC AWARD WINNING PAPER

Characteristics of Chiropractic Patients in the Veterans Health Administration During the COVID-19 Pandemic: A Cross-Sectional Analysis

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ABSTRACT

Objective: The purpose of this study was to determine whether patient characteristics were associated with face-to-face (F2F) and telehealth visits for those receiving chiropractic care for musculoskeletal conditions in the US Veterans Health Administration (VHA) during the COVID-19 pandemic.

Methods: A retrospective cross-sectional analysis of all patients (veterans, dependents, and spouses) who received chiropractic care nationwide at the VHA from March 1, 2020, to February 28, 2021, was performed. Patients were allocated into 1 of the following 3 groups: only telehealth visits, only F2F visits, and combined F2F and telehealth visits. Patient characteristics included age, sex, race, ethnicity, marital status, and Charlson Comorbidity Index. Multinomial logistic regression estimated associations of these variables with visit type.

Results: The total number of unique patients seen by chiropractors between March 2020 and February 2021 was 62 658. Key findings were that patients of non-White race and Hispanic or Latino ethnicity were more likely to attend telehealth-only visits (Black [odds ratio 1.20, 95% confidence interval {1.10-1.31}], other races [1.36 {1.16-1.59}], and Hispanic or Latino [1.35 {1.20-1.52}]) and combination telehealth and F2F care (Black [1.32 {1.25-1.40}], other races [1.37 {1.23-1.52}], and Hispanic or Latino [1.63 {1.51-1.76}]). Patients younger than 40 years of age were more likely to choose telehealth visits ([1.13 {1.02-1.26}], 66-75 years [1.17 {1.01-1.35}], and >75 years [1.26 {1.06-1.51}]) vs those 40-55 years of age). Sex, visit frequency, and Charlson Comorbidity Index showed significant relationships as well, while marital status did not.

Conclusion: During the COVID-19 pandemic, VHA patients with musculoskeletal complaints using chiropractic telehealth were more ethnically and racially diverse than those using F2F care alone. (*J Manipulative Physiol Ther* 2023;00:1-8)

Key Indexing Terms: *Demography; Remote Consultation; Telephone; Chiropractic; Telemedicine; COVID-19; Pandemics*

INTRODUCTION

The American College of Physicians,¹ Centers for Disease Control and Prevention,² and American Academy of Pain Medicine³ guidelines have recommended non-pharmacological therapy to be included in first-line pain management of musculoskeletal (MSK) complaints. Yet, during the COVID-19 pandemic, patients managing their pain with non-pharmacological therapies faced barriers to care, and many were unable to continue their courses of in-person treatment.⁴ It has been suggested that opioid prescription and use during this time increased as some substituted opioids for non-pharmacological therapies.⁴⁻⁶ Telehealth implementation of non-pharmacological therapies has become an important avenue for reducing opioid consumption and other pharmacological methods of pain control.

During the COVID-19 pandemic, there was a trend of increased telehealth use.⁷⁻¹⁰ The Centers for Disease

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Control and Prevention studied and encouraged the use of telehealth for social distancing and continuity of care purposes.¹¹ However, socioeconomic and rural/urban disparities continued to predominate.¹² Early findings indicate that patients of non-White race and younger patients use telehealth more frequently.¹³⁻¹⁵

A review found that telehealth leads to similar outcomes as face-to-face (F2F) care.¹⁶ A trial on psychologically informed behavioral therapy for individuals with chronic MSK pain using telehealth in the Veterans Health Administration (VHA) showed that telehealth was as effective as F2F care for pain reduction.¹⁷ The differences in acceptance of telephone vs video have also played a role. In a sub-analysis of a rheumatology telehealth study, video visits showed higher patient satisfaction than telephone visits despite high satisfaction with telehealth in all forms.¹⁸ Another study in urological telehealth showed that satisfaction was equal among telephone and video users.¹⁹ Nevertheless, telephone visits remained a part of the telehealth paradigm.²⁰⁻²²

Chiropractic care can deliver guideline-concordant non-pharmacological services for individuals with MSK pain and conditions. Chiropractic care in the VHA has been delivered widely²³ as part of evidence-based non-pharmacological therapies²⁴ and is associated with decreased use of prescription opioids.²⁵⁻²⁷ Currently, the literature on chiropractic and telehealth consists of descriptive works.^{8,28,29} Large-scale studies looking at which types of patients receive telehealth chiropractic care (TCC) vs others have not yet been performed. A study assessing trends in VHA chiropractic telehealth visits⁸ showed an increase in telehealth use to meet the demand for continuity of care early in the COVID-19 pandemic. However, the characteristics of patients who received care via F2F and/or telehealth have not been reported. Therefore, the purpose of this study was to measure the association between patient characteristics with the use of TCC in the VHA.

METHODS

Patient Cohort and Demographics

This was an observational study using electronic health record data extracted from the VHA Corporate Data Warehouse (CDW). The manuscript follows the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines.³⁰ Inclusion criteria were that patients had a visit to VHA chiropractic as either a F2F or a TCC visit (ie, "TeleChiropractic Care"; <https://telehealth.va.gov/type/clinic>) from March 1, 2020, to February 28, 2021. Patients could include veterans, dependents, and spouses. There was no predetermined study size or other inclusion or exclusion requirements. Demographic data collected from the electronic health record included age, sex, race, ethnicity, and marital status. The study was approved by the VA

Central Institutional Review Board and the Institutional Review Board of the VA Connecticut Health System.

All characteristics, except for visit frequency, were categorical variables. Demographics were constructed from existing CDW data elements. Age was grouped into the following 5 categories: younger than 40 years old, 40 to 55 years old, 56 to 65 years old, 66 to 75 years old, and older than 76 years old. Birth sex in CDW was reported as male and female. Patient race categories included White, Black, other (ie, Native American and Asian populations), and missing. Ethnicity categories included Hispanic or Latino, not Hispanic or Latino, and missing. Marital status included married, not married (ie, single, separated, divorced, widowed, etc), and missing. Missing categories were collected from explicitly missing data, data labeled as "NULL," or data classified as "unknown by patient." Visit frequency was collected per patient as a discrete variable.

Calculation of Charlson Comorbidity Index

The Charlson Comorbidity Index (CCI) score, a widely used and validated measure of comorbidity,³¹ was calculated for each patient in our cohort. This was performed using International Classification of Diseases, Ninth Revision (ICD-9) and Tenth Revision (ICD-10) codes from any visit within a 5-year lookback period (ie, March 1, 2015, to March 1, 2020).

Calculation of CCI was performed using ICD-9 and ICD-10 comorbidity groupings defined by Quan et al.³² Comorbidity groupings (such as myocardial infarction, congestive heart failure, dementia, diabetes, etc) were calculated separately using ICD-9 and ICD-10 scores. For each patient, whichever ICD code calculation produced the highest score within a grouping was taken into the final CCI score calculation. CCI scores were categorized into 0, 1, 2, or 3 or higher.

Statistical Analysis

Three mutually exclusive categories were defined as follows: "F2F only," "TCC only," and "F2F and TCC." The category "F2F only" described patients who exclusively had in-person F2F visits to all VHA chiropractic clinics nationally during the study period. The category "TCC only" described patients who exclusively had telehealth chiropractic (telephone or video) visits during the study period. Visits were identified using VHA's internal coding system (stop codes). Chiropractic clinic visits were identified by stop code 436, and video visits were identified by stop codes 170, 690, 692, and 693. Telephone visits were defined by any visit in chiropractic clinics containing telephone evaluation and management Current Procedural Terminology codes (99441, 99442, 99443, 98966, 98967, 99358). The category "F2F and TCC" described patients who had both in-person F2F visits and TCC visits during the study period.

Multinomial univariable and multivariable logistic regression was used to compare “TCC only” and “F2F and TCC” vs the group “F2F only” to obtain the estimates of odds ratios for the demographic, comorbidity, and visit number variables. Data in our cohort were checked to make sure that they were concordant with the assumptions required by multivariable analysis, chiefly that there was an absence of multicollinearity and a lack of strongly influential outliers. We present adjusted odds ratios for the full multivariable logistic regression model and 95% confidence intervals to characterize the uncertainty associated with our estimates. Reference groups were as follows: 40 to 55 age group (the median age group), male sex, White race, non-Hispanic or non-Latino ethnicity, and married marital status, all of which reflect the standard VHA demographic profile.³³ For CCI, the reference group was the 0 CCI score group. Patients with “NULL” identifiers and test patient files were removed from the dataset. The “Missing” categories within each demographic group were reported in the descriptive statistics but not included in the statistical model since we did not attempt to impute missing values.

RESULTS

Patient Characteristics and CCI Scores

We identified 62 658 patients receiving VHA chiropractic care during the study period. Table 1 describes the characteristics of the cohort. Counts and percentages are given for unique patients. Descriptive statistics are presented for each group as well as the total.

Multinomial Logistic Regression

The total number of patients in the “F2F only” group was 46 236, in the “TCC only” group was 4361, and in “TCC and F2F” was 12 061 (Table 2). Patients had lower odds with “TCC only” visits vs “F2F only” visits, while those with a combination of visit types had higher visit frequency. Patients of female sex had higher odds of “F2F and TCC” visits. The odds of patients of non-White race and Hispanic or Latino ethnicity were higher in both “TCC only” and “F2F and TCC” visit types. Patients younger than 40 years of age had higher odds than those of the reference age group of 40 to 55 years for both “TCC only” or “F2F and TCC” visit types. Those 66 years and older had higher odds for “TCC only” for 66 to 75 years and for older than 75 years. Those with a CCI score of 1 were more likely to have “TCC only” visits than those with the reference CCI score of 0, but those with CCI scores of 2 or higher were less likely to have “F2F and TCC” visits for a CCI score of 2 and for a CCI score of 3 or higher.

DISCUSSION

To our knowledge, this is the first study to describe associations of patient characteristics and telehealth visits for

patients receiving non-pharmacological MSK care in a large national cross-section of patients. Results from this study may influence ongoing efforts to optimize telehealth delivery in VHA and inform efforts to determine what kinds of patients this care delivery modality may be most appropriate for.

Patients of non-White race and Hispanic or Latino ethnicity were more likely to attend both “TCC only” and “F2F and TCC” than “F2F only” visit types, even after adjusting for visit numbers and other patient characteristics. Positive associations in the use of “F2F and TCC” and “TCC only” care were also found in the other patient categories. We also saw associations among patients of female sex, younger age, and non-White race.

Studies that focus on a wide breadth of patient characteristics with telehealth preferences are limited. Equally, we know of no studies describing patient characteristics associated with non-pharmacological MSK telehealth. Four studies have discussed demographic associations with telehealth more generally.^{13-15,34} Although these primarily focused on telehealth access for specific groups,³⁴ we saw similar results in our work in terms of higher use of chiropractic telehealth by non-White patients and patients of Hispanic ethnicity. Ryskina et al³¹ found that although telehealth visits did not change the quality of care, older Black patients receiving telehealth showed increased hospitalization, indicating the need for overall improvement in care quality, no matter the therapy.

Ryskina et al found that patients of Hispanic ethnicity were not more likely to use telehealth.³⁴ Likely, this is because of a language barrier between the Hispanic population of the United States at large compared with that of Hispanic veterans. Army language policy (AR 600-20 paragraph 4-13) specifies that “English is the operational language of the Army,” implying that Hispanic soldiers are expected to have English language proficiency.³⁵ This may indicate that language is not as much of a barrier for Hispanic veterans as it is among the Hispanic population of the United States at large. This larger Hispanic population’s English language proficiency, although on the rise, shows 26% of Hispanic Americans saying that their speaking ability is less than “very well,” and 7% not being able to speak English.³⁶ This is likely why Ryskina et al saw no association with telehealth in the Hispanic and Latino cohort and why we observed an association in our cohort. This, nevertheless, indicates that access to care of any kind for Hispanic and Latino patients, including telehealth, remains a continuing public health challenge.

Our results show that patients older than 65 years of age were more likely to receive “TCC only” care, which could be explained by policies that encouraged and, in some cases, required older patients to not make hospital or clinic visits except in emergencies.^{37,38} However, the oldest age groups were not likely to use combined “F2F and TCC” care. Older adults may have difficulty or prefer not to engage with telehealth because of the technological

Table 1. Demographics, CCI Scores, and Visit Frequency for Unique Patients in the Cohort During the Study Period

Variable	F2F Only	TCC Only	F2F and TCC	Total Unique Patients
Patients, n	46 236	4361	12 061	62 658
Age, n (%)				
<40	10 110 (21.9%)	1053 (24.1%)	3119 (25.9%)	14 282 (22.8%)
40-55	14 416 (31.2%)	1280 (29.4%)	3807 (31.6%)	19 503 (31.1%)
56-65	9284 (20.1%)	832 (19.1%)	2376 (19.7%)	12 492 (19.9%)
66-75	9172 (19.8%)	865 (19.8%)	2076 (17.2%)	12 113 (19.3%)
>75	3254 (7.0%)	331 (7.6%)	683 (5.7%)	4268 (6.8%)
Sex, n (%)				
Male	38 371 (83.0%)	3600 (82.5%)	9677 (80.2%)	51 648 (82.4%)
Female	7865 (17.0%)	761 (17.5%)	2384 (19.8%)	11 010 (17.6%)
Race, n (%)				
White	33 950 (73.4%)	3001 (68.8%)	8234 (68.3%)	45 185 (72.1%)
Black	7892 (17.1%)	839 (19.2%)	2372 (19.7%)	11 103 (17.7%)
Other	1676 (3.6%)	207 (4.7%)	562 (4.7%)	2,445 (3.9%)
Missing	2718 (5.9%)	314 (7.2%)	893 (7.4%)	3925 (6.3%)
Ethnicity, n (%)				
Hispanic or Latino	3495 (7.6%)	464 (10.6%)	1362 (11.3%)	5321 (8.5%)
Not Hispanic or Latino	41 183 (89.1%)	3734 (85.6%)	10 211 (84.7%)	55 128 (88.0%)
Missing	1558 (3.4%)	163 (3.7%)	488 (4.0%)	2209 (3.5%)
Marital status, n (%)				
Married	24 719 (53.5%)	2275 (52.2%)	6200 (51.4%)	33 194 (53.0%)
Not married	20 909 (45.2%)	2024 (46.4%)	5680 (47.1%)	28 613 (45.7%)
Missing	608 (1.3%)	62 (1.4%)	181 (1.5%)	851 (1.4%)
CCI score, n (%)				
0	14 160 (30.6%)	1379 (31.6%)	4192 (34.8%)	19 731 (31.5%)
1	8332 (18.0%)	792 (18.2%)	2279 (18.9%)	11 403 (18.2%)
2	6472 (14.0%)	565 (13.0%)	1641 (13.6%)	8678 (13.8%)
3 or higher	17 272 (37.4%)	1625 (37.3%)	3949 (32.7%)	22 846 (36.5%)
Visit frequency, median (Q1-Q3)				
	5 (3-8)	1 (1-2)	6 (4-10)	5 (3-9)

CCI, Charlson Comorbidity Index; F2F, face-to-face; OR, odds ratio; TCC, telehealth chiropractic care.

Table 2. Characteristics Associated With “F2F and TCC” Visits or “TCC Only” Visits vs “F2F Only” Visits

Characteristic	Telehealth Only Adjusted OR (95% CI)	F2F and TCC Adjusted OR (95% CI)
Age		
<40	1.13 (1.02-1.26)	1.19 (1.11-1.27)
40-55	Reference	Reference
56-65	1.06 (0.94-1.20)	1.08 (1.00-1.16)
66-75	1.17 (1.01-1.35)	1.02 (0.93-1.12)
>75	1.26 (1.06-1.51)	1.00 (0.89-1.13)
Sex		
Male	Reference	Reference
Female	1.06 (0.97-1.16)	1.11 (1.05-1.17)
Race		
White	Reference	Reference
Black	1.20 (1.10-1.31)	1.32 (1.25-1.40)
Other	1.36 (1.16-1.59)	1.37 (1.23-1.52)
Ethnicity		
Hispanic or Latino	1.35 (1.20-1.52)	1.63 (1.51-1.76)
Not Hispanic or Latino	Reference	Reference
Marital status		
Married	Reference	Reference
Not married	1.02 (0.95-1.09)	1.03 (0.98-1.07)
CCI score		
0	Reference	Reference
1	1.15 (1.03-1.28)	0.94 (0.87-1.01)
2	1.08 (0.94-1.25)	0.86 (0.79-0.94)
3 or higher	1.08 (0.93-1.26)	0.84 (0.76-0.92)
Visit frequency	0.37 (0.35-0.39)	1.17 (1.16-1.18)

CCI, Charlson Comorbidity Index; CI, confidence interval; F2F, face-to-face; OR, odds ratio; TCC, telehealth chiropractic care.

learning curve and technology that is not tailored to geriatric populations.^{39,40} This may be why we found a lack of association with older age and combination visit type seen in our study. Choi et al⁴¹ studied the relationship between age and telehealth use and found that most negative

associations disappeared when controlled for rates of information and communication technology ownership. This may suggest that public health efforts should aim at educating patients on how to use technology to access telehealth, not only distribution, to close this use gap.

Female patients have been shown to have higher odds of satisfaction with telehealth,^{19,42} although use may be confounded by factors unique to each specialty.⁴³ The higher odds of female patient satisfaction do not appear to agree with the lack of an association with “TCC only” visits. Perhaps other factors, such as those surrounding women’s health or possible preferences for combination “F2F and TCC” care over “TCC only” care, that have not yet been considered present obstacles to their actual use of TCC services.

Comorbidities measured with the CCI score did not mirror the visit types of older age groups. Existing work has consistently grouped older age and comorbidity together.^{44,45} Despite this, we did not find higher comorbidities associated with “TCC only” visits as we saw with older age. Paradoxically, those with a CCI score of 1 were more likely than those with higher scores to receive “TCC only” care, whereas those with CCI scores of 2 and higher were less likely to receive combination “F2F and TCC” care. The extent to which the emphasis that chiropractic clinicians and their patients place on age as a risk factor, as opposed to comorbidity, should be explored in future research.

Higher numbers of visits per patient were associated with the use of “F2F and TCC” care yet were also associated with lower use of “TCC only” care. This may indicate that “TCC only” was used as a stop-gap measure for continuity of care, especially when considering that “TCC only” visits were overwhelmingly telephone visits. However, “F2F and TCC,” which had a higher proportion of video visits, likely indicates that chiropractic clinicians and their patients were more inclined to use this approach to continue the delivery of established treatment plans.

Other studies have described disparities in delivering telehealth to underserved communities, focusing on specific demographics. Age and race have been demographic characteristics in which the delivery of telehealth has seen many disparities. These 2 characteristics have been studied in relation to the delivery of telehealth in the context of a multitude of different pathologies, from inflammatory bowel disease⁴⁶ to HIV.⁴⁷ The results of telehealth for HIV described visit types, which were opposite of our findings, with White patients disproportionately using more telehealth than other racial groups.⁴⁷ In contrast, a study of inflammatory bowel disease found that disparities between age and race narrowed with increased use of telehealth by comparing pre-COVID-19 telehealth use to telehealth use following the onset of COVID-19.⁴⁶ These studies appear to indicate that telehealth use may be specific to each healthcare specialty. The causes of demographic differences for each patient population are likely unique to each specialty as well, stemming from historical differences and varying approaches to treatment.

Limitations

The VHA CDW system likely contains discrepancies common to large data warehouses, such as miscoding, mislabeling, and discrepancies in updating data.⁴⁸⁻⁵⁰ Despite this, previous work has shown much reason to be confident in the accuracy of VHA CDW data.^{51,52} The “TCC only” group of patients contained primarily telephone visits that did not represent the full breadth of chiropractic telehealth. US Veterans Health Administration data tend to heavily comprise patients who are White, older, and male.³³ In addition, chiropractic care offered at the VHA is integrated with multiple other specialties and, in many cases, in a hospital setting, whereas 82.4% of chiropractors work in a private chiropractic practice.⁵³ Therefore, generalizability of our findings to other patient populations is limited. Additionally, potentially confounding variables such as access to affordable transportation, rurality, proximity of the VHA chiropractic clinic to the patient, and technological factors, such as Wi-Fi or phone line connection, were either not considered or not available for this study and may have influenced the findings.⁵⁴⁻⁵⁶

Future Research

This work can inform additional inquiries into non-pharmacological telehealth treatments for patients with MSK pain delivered by various providers. It can also spur additional exploration into strategies that may prove more inclusive for patients with wider demographic and social identifiers. Although some data exist for socioeconomic disparities in telehealth use,^{10,12} more work is needed to understand how non-pharmacological telehealth care for patients with MSK pain can be optimized for those of lower socioeconomic status and/or those living in rural areas. Equally, this work opens the possibility for qualitative and causative research into the reasons behind the demographic associations we describe here. Further research is needed to better understand factors influencing the use of telehealth and their relationship with patient and system outcomes.

CONCLUSION

During the COVID-19 pandemic, VHA patients with MSK complaints using chiropractic telehealth or a combination of TCC and F2F care were more ethnically and racially diverse than those using F2F care alone.

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Practical Applications

- Patient characteristics were associated with face-to-face and telehealth visits for those receiving chiropractic care for musculoskeletal conditions in the US Veterans Health Administration during the COVID-2019 pandemic.
- The total number of unique patients seen by chiropractors between March 2020 and February 2021 was 62 658.
- We found that Veterans Health Administration patients with musculoskeletal complaints using chiropractic telehealth were more ethnically and racially diverse than those using face-to-face care alone.

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